

WHAT IS CLAIMED IS:

1. A motor/generator comprising:

a first rotation shaft;

a first rotor rotating with the first rotation shaft and having a first number of magnetic poles that form a first magnetic field;

a second rotation shaft rotating relative to the first rotation shaft and supported co-axially with the first rotation shaft;

a second rotor rotating with the second rotation shaft and having a second number of magnetic poles that form a second magnetic field, the first number and the second number being different, the first rotor and the second rotor being disposed in series along the first rotation shaft;

a stator provided with coils that generate a first rotating magnetic field in synchronism with the first magnetic field by application of a first alternating current, and generate a second rotating magnetic field in synchronism with the second magnetic field by application of a second alternating current; and

a current control device that supplies a composite current comprising the first alternating current and the second alternating current to the coils.

2. The motor/generator as defined in Claim 1, wherein the stator is disposed facing an outer periphery of the first rotor and the second rotor.

3. The motor/generator as defined in Claim 2, wherein the stator is provided with a plurality of core units separated in a peripheral direction, each core unit is provided with a first core facing an outer periphery of the first rotor

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and a second core facing an outer periphery of the second rotor and magnetically connected with the first core, and a magnetic resistance between adjacent core units is set to be greater than a magnetic resistance between the first core and the second core of the same core unit.

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4. The motor/generator as defined in Claim 3, wherein each core unit is further provided with a third core magnetically connecting the first core and the second core.

5. The motor/generator as defined in Claim 4, wherein the first core comprises magnetic steel plates laminated in the direction of the first rotation shaft, the second core comprises magnetic steel plates laminated in the direction of the second rotation shaft, and the third core comprises magnetic steel plates laminated in the direction of a periphery of the stator.

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6. The motor/generator as defined in Claim 3, wherein the first core comprises magnetic steel plates laminated in the direction of the first rotation shaft, and the second core comprises magnetic steel plates laminated in the direction of a periphery of the stator.

7. The motor/generator as defined in Claim 1, wherein each of the coils is wound on the first core of each core unit.

8. The motor/generator as defined in Claim 7, wherein the motor/generator is further provided with coils each of which is wound on the second core of each

core unit.

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9. The motor/generator as defined in Claim 3, wherein the stator is accommodated in a case that has a passage of liquid coolant, and supported inward by the case.

10. The motor/generator as defined in Claim 3, wherein the motor/generator comprises a magnetic shield surrounding an outer periphery of the stator.

11. The motor/generator as defined in Claim 2, wherein the stator comprises a plurality of cores disposed adjacent to one another, each core is provided with an inner peripheral part and an outer peripheral part, the outer peripheral part being in contact with an outer peripheral part of an adjacent core, the inner peripheral part projecting inward, and each of the coils being wound on the inner peripheral part.

12. The motor/generator as defined in Claim 1, wherein the stator is provided with a plurality of first cores facing an outer periphery of the first rotor and an equal number of second cores facing an outer periphery of the second rotor, each of the first cores being provided with an inner peripheral part and an outer peripheral part, the outer peripheral part of the first core being in contact with an outer peripheral part of an adjacent first core, the inner peripheral part of the first core projecting inward, each of the second cores being provided with an inner peripheral part and an outer peripheral part, the outer peripheral part of the second core being in contact with an outer

peripheral part of an adjacent second core, the inner peripheral part of the second cores projecting inward, the coils comprising first coils each of which is wound on the inner peripheral part of the first core, and second coils each of which is wound on the inner peripheral part of the second core.

13. The motor/generator as defined in Claim 12, wherein the first coils and the second coils are connected in parallel to the current control device.

14. The motor/generator as defined in Claim 12, wherein the first coils and second coils are connected in series to the current control device.

15. The motor/generator as defined in Claim 1, wherein the first rotation shaft penetrates the second rotation shaft, and the second rotation shaft is supported by a plurality of bearings so as to be free to rotate relative to the first rotation shaft.

16. The motor/generator as defined in Claim 15, wherein the motor/generator further comprises a case accommodating the stator, a bearing supporting the first rotation shaft on the case and a bearing supporting the second rotation shaft on the case.

17. A motor/generator comprising:

a first rotation shaft;

a first rotor rotating with the first rotation shaft and having a first number of magnetic poles that form a first magnetic field;

a second rotation shaft rotating relative to the first rotation shaft, the second rotation shaft and the first rotation shaft having different rotation axes; <sup>112</sup>

a second rotor rotating with the second rotation shaft and having a second number of magnetic poles that form a second magnetic field, the first number and the second number being different;

a first stator provided with a third number of first coils that generate a first rotating magnetic field in synchronism with the first magnetic field by application of a first alternating current;

a second stator provided with a fourth number of second coils, the third number and the fourth number being equal, the second coils generating a rotating magnetic field in synchronism with second magnetic field by application of a second alternating current; and

a current control device that supplies a composite current comprising the first alternating current and the second alternating current to the first coils and the second coils.

18. The motor/generator as defined in Claim 17, wherein the first coils and the second coils are connected in series to the current control device.

19. The motor/generator as defined in Claim 17, wherein the first coils and the second coils are connected in parallel to the current control device.

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